Mulch laying machine: A Literature Review

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Abstract- *This paper establishes the development of an agricultural mulch laying apparatus used for covering the soil/ground and adjust the mechanism to maintain favorable conditions for plant growth, moisture conservation, weed control, development and efficient crop production rate. It has been found a new mulching machines of optimum cost sturdy construction, fine finish, easy to operate for the unskilled farmer can do and poor farmer can purchase with the invention comprises novel constructions, combinations and arrangements of components.*

Keywords- Mulch laying apparatus, efficient crop production, Novel construction.

I. INTRODUCTION

"Mulching" is the practice of covering the soil around plants to improve the growing condition for the crop. The use of plastic mulches results in higher yields and decreased need of irrigation. Mulches can also enhance moisture control, soil temperature, reduce the spread of soil borne diseases, reduce weed growth, reduce soil erosion); and provide nutrients and organic matter. Laying the drip irrigation pipe and mulching paper requires lots of labours cost and time. It will be effort less for farmer by reducing the capital cost and time of laying the mulching paper using the most convenient method as well placing the drip irrigation pipe in one pass of the machine.

Mulching paper laying machine lay the drip line pipe and mulching paper at the same time. It also will make holes on the paper to provide plantation area after laying the drip irrigation and the mulching paper. Also it will cover the paper with the soil on its either side edges to avoid the deflection of paper from its positions because of various reasons such as disturbance from wind, working labours. This machine will avoid the wages of labours used for laying drip line pipe and mulching paper as compared to conventional method which is not that much accurate and easy. In this project, working and design efforts and increasing productivity of crops is considered as main objective quation.The main objective of this development of mulching machine for spreading of mulch paper for covering of soil in order to provide a barrier to soil pathogens, to limit the water losses and conserves moisture, to maintain a water temperature even during night time which enables seeds to germinate quickly and for young plants to rapidly establish a strong root growth system with the aim to assess and determine minimum justified annual utilization of mulching machines of various manufacturers from the economy point of view.

II. LITERATURE REVIEW

1. Development and evaluation of tractor operated plastic mulch laying equipment by M. Veerangouda(2017)

In this paper author have proposed a design and development of tractor operated plastic mulch laying equipment was developed to mechanize the conventional plastic mulching. A plastic mulch roller was mounted on the main frame of equipment and drip roll carrier assembly also mounted on main frame. The soil covering unit and press wheel assembly have been attached to it with the help of clamps. A 35 hp tractor was used as a power unit for both plastic mulching and drip laying operation. Various parameters such as soil moisture content, draft, fuel consumption and soil temperature were measured. The average soil moisture of the plastic mulched beds was 19.20, 19.30 and 19.20 % at forward speed of 2.0, 3.0 and 4.0 km h-1, respectively. The average values of draft were 3139, 3193 and 3222 N at forward speed of 2.0, 3.0 and 4.0 km h-1, respectively.

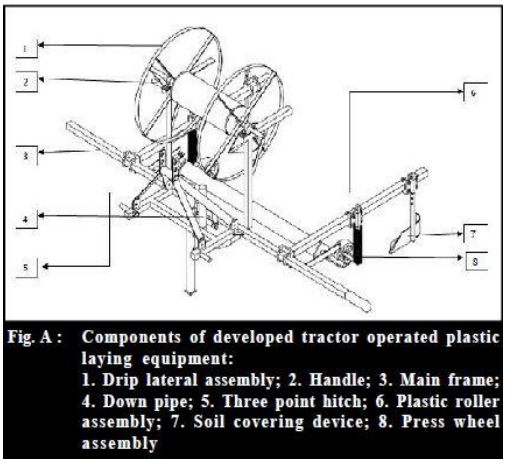

Fig. A : Components of developed tractor operated plastic laying equipment:
1. Drip lateral assembly; 2. Handle; 3. Main frame; 4. Down pipe; 5. Three point hitch; 6. Plastic roller assembly; 7. Soil covering device; 8. Press wheel assembly

Fig 1.Tractor operated plastic laying equipment.

2. Advanced Mulching Paper and Drip laying Machine by Prof. U.Y.Siddha (2017)

Here authors have worked on automatic mulching paper laying machine which also have attachment for the drip laying. They have prepared one working model in which drip line is guided below the paper by drip line director and at the same time mulch paper is placed over the bed by paper pressing rollers. Also make research on the topic of plasticulture which is crucial to Indian agriculture in view of the changing technological scenario for boosting crop yields and productivity. Introduction of linear low density polyethylene (LLDPE) as a mulch film has brought a revolution in agricultural water management. It is actually a boon to dry land farmers. This is one of the fastest growing plasticultural applications in the world. The cost of LLDPE film is also lesser than one third of LDPE mulch film. Moreover for mulch activity lower thickness (15 to 20 microns) are highly suitable. However due to ever increasing cost of raw materials the films are costlier now. Hence Government should take all possible measures to produce the film in a mass scale and make it available to the farmers at a reasonable price.

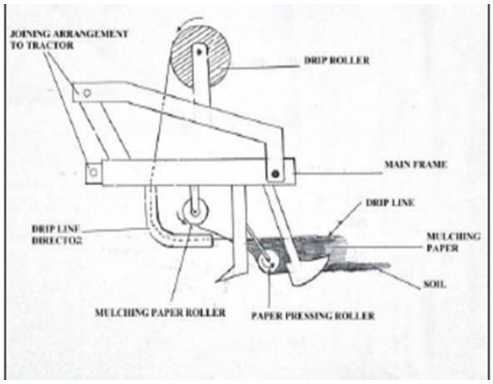

Fig 2.Drip laying machine

3. Automatic mulching paper laying machine by Mr. Deokar (Feb2018)

Here authors have designed the frame for the heavy duty operation because it should be able to withstand at high loads, Shocks and the weight of the components which are acting on it during mulch laying and drip line plotting.

The main purpose of the machine here is to lay the mulching paper on the beds of the soil as well as the drip pipe with it. reducing the capital cost and time of laying the mulching paper using the most convenient methods well placing the drip irrigation pipe in one pass of the machine. When the motor start rotating it transmits the rotary motion towards the axle through the chain drive and the whole machine starts moving. Though the wheels starts rotating and at the same time paper is placed under the front wheels because of that the mulching paper roll is also starts rotating and starts unwound. As machine moves forward the paper is also continues un-wounding and lay on the beds. As we know the paper cutting wheel is mounted on the front wheel which rotates with the axle it also starts making holes on the paper and as the machine speed varies at the same rate the cutting wheels speed varies and hence the hole are made at specified fixed length at any speed.

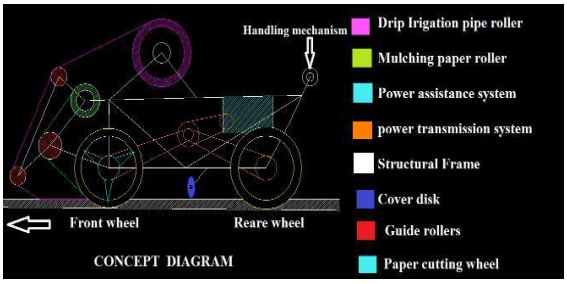

Fig 3.Design of Automatic mulch paper laying machine.

4. Design and development of plastic mulch laying machine in agriculture by Prof. B. Durga Prasad(2017)

In this paper authors have proposed a design of mulch laying machine that combines some of the important operations. The developed machine lays plastic mulch at exact position on the prepared plantation bed and secures it with soil. The laying of plastic mulch, drip pipe and hole punching will done in one pass. The Plastic Mulch Laying machine simple device which may available at low cost compared to other existing machinery. This machine may be more useful for the small-scale farmers who will concentrate on high yield variety crops. For the professional growers the time consumption for laying of mulch, drip, and hole punching will be less by this machine. Due to this machine number of skilled labours will be reduced. Thus, the plastic mulch laying machine may give immediate solution for the advancement in the cultivating methods in agricultural sector.

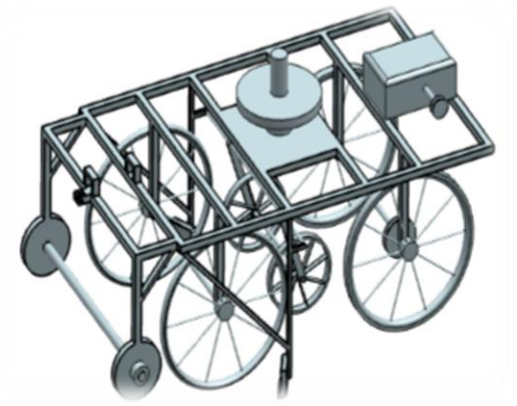

Fig 4.Assembly drawing

5. Mulching Paper and Drip Laying Machine by S. D. Ratnakar (2017)

This paper focuses on design and manufacture of a small size portable Mulching paper laying machine working either manually or powered externally. Deficit rain poses a big problem for any agricultural activity In order to increase crop production with scarcity of water farmers are moving towards technical solutions like plastic mulching paper. Most of the available techniques are efficient for performing a particular task like laying mulch or for laying Drip line. There are integrated machines but they are either expensive or too big to be operated in small scale farms. The scope of the project extends to building a small size portable machine which integrates all the above mentioned tasks like laying paper as well as drilling holes and laying drip line performs them efficiently. Such a machine reduces the efforts and saves time taken from ploughing to seeding.

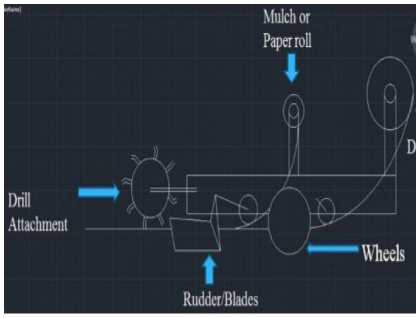

Fig 5.Mulching paper laying machine.

6. Mulching Paper Laying Machine For Agricultural Application by Mr. A.V.Salve(2018)

This paper looks at working and design parameters of mulching paper laying machine for minimizing the human efforts and increasing productivity of crops. In this case Mulching paper laying machine, lay the drip line pipe and mulching paper at the same time. It also will make holes on the paper to provide plantation area after laying the drip irrigation and the mulching paper. Also it will cover the paper with the soil on its either side edges to avoid the deflection of paper from its positions because of various reasons such as disturbance from wind, working labours. This machine will avoid the wages of labours used for laying drip line pipe and mulching paper as compared to conventional method which is not that much accurate and easy. This paper looks at working and design parameters of mulching paper laying machine for minimizing the human efforts and increasing productivity of crops.

7. A pneumatic dibbling machine for plastic mulch by M. J. Lawrence

A machine capable of placing planting holes for a wide variety of spacings in plastic mulch beds with very little physical reconfiguration was designed and tested. The three-point hitch mounted machine was demonstrated with two horticultural crops which have widely varying within-row and between-row spacing requirements: onions and potatoes. The piercing mechanisms were powered by pneumatic cylinders, and the on-board controls allowed users to adjust the number and spacing of holes. Switches enabled between-row spacing to vary by placing from one to four planting holes across a standard 76-cm (30-in.) bed. For the algorithm used, a dial was set to create the within-row spacing between 15 and 61 cm (6 and 24 in.). These control settings and a fixed tractor speed acted as inputs to a microprocessor which calculated hole placement frequency and initiated cylinder activation. The machine has been in use for two planting seasons with promising results. Hole placement accuracy data were collected for both onions and potatoes. The potato tests were performed for a within-row spacing of 30 cm (12 in.) and produced 96% of the planting holes within 10% of the target spacing distance. The onion tests were performed for a within-row plant spacing of 15 cm (6 in.) and produced 98% of the planting holes within perfection.

Fig 6.machine frame with electro-pneumatic components

III. ADVANTAGES

1. Easy in operation.
2. Multifunction like Drip pipe laying and Hole Making attachment.
3. Simple working and easy to use.
4. Even unskilled worker can use it.
5. Simple construction.
6. Less operation and maintenance cost.
7. Easy to setup.
8. Light weight as compared to machines available in market.

IV. CONCLUSION

The designed, developed and technologically updated range of Mulching Machine is to be found for the clients that offer great relief to farmers in a best possible and effective manner. This machine is user friendly; with fine finish, glitch free and easy to operate. This machine is made up of quality raw materials that are easily available in the market. We accept and agree that the machine will have wider demand across the market for the long life span and best performance or efficiency. The mulching machine meets the growing needs of farmers who wish continuously to improve the profitability of their farming by using new technology in machine. This equipment is manufactured using standard and high grade best quality raw materials with best affordable price range for all farmers and labours.

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